World's Largest Shotgun?

Proposed 120mm Tank Round Would Regain Antipersonnel Capability

by Lieutenant Colonel David W. Pride

"GUNNER...CANISTER...TROOPS!"

U.S. tank commanders have not barked a canister fire command in combat for many years, but if a new development is funded, they may soon be firing canister rounds from their 120mm cannons.

Developed over 200 years ago for artillery, canister was adopted for tank use before WWII. Canister provides tanks with a lethal anti-personnel/materiel capability that machine guns cannot. When canister is fired, hundreds of small subprojectiles are launched in a shotgun-like blast. Canister has no fuze, thus its payload disperses immediately after exiting the muzzle of the tank's main gun. Such rounds were once part of the tank's basic load.

Last used in combat during the Vietnam War, armor and cavalry units equipped with M48A3 tanks and M551 Sheridans regularly used canister rounds to kill enemy soldiers exposed in the open and those protected by bunkers, dense jungle foliage, and darkness.[1]

When the M1A1 and its 120mm gun were fielded in 1986, the active component began losing its tank-fired antipersonnel capability. In 1995, the forward deployed 2ID lost its antipersonnel round capability when 120mm-equipped M1A1s replaced their 105mm IPM1s that fired the old APERS round. Finally, in 1997, when 3-73 Armor's M551 Sheridans were deactivated, the Army lost its only canister-capable unit.

Today, 10-plus years after the Cold War ended, our M1A1 and M1A2 tanks are still unable to provide rapid, effective, close-in lethal fire against massed assaulting infantry armed with anti-tank weapons. This deficiency, coupled with limited side armor protection of the Abrams, reduces the tank's survivability and impacts the effectiveness of the infantry it supports.

Soon, if the Armor Center is successful, the canister situation will change. Army transformation, the changing operational environment, and an urgent request from the field all contribute to the immediate need for a canister round for the 120mm Abrams fleet.

The Mission Need

In December 1999, U.S. Forces, Korea (USFK) sent a Theater Urgency of Need Statement to the Army's Office of the Deputy Chief of Staff for Operations – Force Development (ODCS-OPS-FD) requesting the immediate procurement of 120mm, close range, anti-personnel ammunition for M1A1/M1A2 tanks. USFK requires their tank force have the capability to quickly and effectively defeat close-in infantry threats. This serious request from an Army CINC cannot go unanswered.

USFK's request came at a time when the Armor Center was mulling over the new operational environment confronting our mounted forces. The new strategic framework created by Army transformation compelled the Armor Center to review its mechanized force modernization strategy. During the development of the 2000 Mechanized Force Modernization Plan (MFMP) the canister requirement emerged as a top priority. The Armor Center, in response to the force's changing environment and USFK's request for assistance, developed an Operational Requirements Document (ORD) to formally articulate the Armor Force's need for a 120mm canister round.[2]

Historical Precedents

Cannon-fired canister rounds are not a new concept. Canister was used during the U.S. Revolutionary War by naval and ground forces. During the U.S. Civil War, both sides used artillery-fired canister to break up enemy formations of attacking infantry and cavalry. Respected by infantry and artillery alike, the direct fire artillery canister load was then known as "grape shot," because of the many small steel balls housed within the can-shaped projectile.

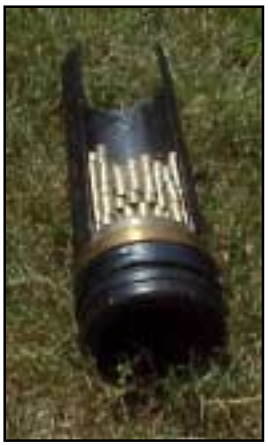
Tank-fired anti-personnel rounds are not new, either. At the start of WWII, M2/M3 tanks mounting 37mm guns stored canister rounds as part of their basic load. Unfortunately, not much is found in WWII historical files about the use of canister in Army combat operations. Most of the Army's European and North African Theater battle reports reference armor-piercing and high explosive tank ammunition.

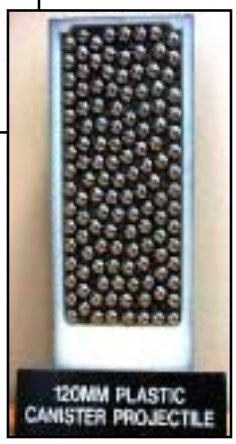
However, in the Pacific Theater of Operation, there is evidence that USMC tanks fired canister to clear underbrush and defeat enemy infantry. On August 21, 1942, during the Battle of the Tenaru (Guadalcanal Campaign), a USMC tank platoon of M3s was credited with using shock action and 37mm canister to terminate the vicious battle.[3] The 37mm canister round contained approximately 122 steel balls.[4]

During the Korean War, the Army and Marine Corps used several different types of tanks, each with varying-sized guns (75mm, 76mm, 90mm), but little is found in historical literature about the use of canister in Korea.[5] A 76mm and 90mm canister round were developed in the early 1950s; however, it is unknown if they were used in Korea. The 76mm canister contained 9 lbs of heavy steel balls, similar in size to "double-aught" buck shot.[6] When fired, the propelling gases forced the steel balls out of the tank's main gun, instantly creating a lethal cone of destruction from the muzzle outward. While there is little historical literature on the use of tank-fired canister in WWII and the Korean War, this is not the case for evidence of canister's use during the Vietnam War.

In Vietnam, U.S. units equipped with M48A3 tanks (90mm) and Sheridans (152mm) regularly used canister rounds to defeat enemy troops. As much as 50 percent of their basic load would consist of canister. In Vietnam, our armored forces employed canister in a wide range of roles during both offensive and defensive operations. The primary role of canister during the Vietnam War was to kill large numbers of exposed enemy personnel with a single

CANISTER...Past and Present





Three examples of U.S. canister rounds, including the 90mm used in Vietnam, far left, the 152mm Sheridan "Beehive Round," center, and the proposed 120mm round, at right.

The new canister round would contain steel balls, flechettes, and pellets, as shown in the photo above.

shotgun-like blast. Canister was also used in a "recon-by-fire" role. Its lethal payload, when released into the jungle foliage, destroyed or prematurely triggered enemy ambushes that were suspected, but not visible. When units established night defensive positions, tank and Sheridan forces intermittently fired canister into the jungle/wood lines in an effort to "harass and interdict" enemy probing patrols.

The anti-personnel effects of the canister round are excellent, and so are its deforestation qualities. Canister was often used to clear thick jungle foliage to improved mobility or create better fields of fire. The 90mm canister round (M336) used by M48A3 tanks contained 1,281 steel pellets. This equates to firing 14.9 lbs of ball bearings at 858 meters/second out to a maximum effective range of 183 meters.[7]

The 152mm canister round (M625) launched approximately 10,000 small, nail-sized darts called "flechettes" out of the Sheridan's short barrel. Launched at a muzzle velocity of 690 meters/second, the flechettes disintegrated everything in their path out to 400 meters.[8] Flechette-filled canister rounds were nicknamed "beehive" rounds because of the distinctive sound heard when the flechettes flew down range. Veteran tankers were partial to both the canister and beehive round for their individual qualities. When pressed to select one or the other, they preferred to keep both.[9]

Combat stories about the employment of canister in Vietnam are plentiful. The following are some anecdotes from various sources about the use of canister in Vietnam:

On 2 December 1966, tankers of 1st Squadron, 11th Armored Cavalry, fighting near Suoi Cat in South Vietnam, used 90mm canister against the Viet Cong (VC) who ambushed the unit. A battlefield search the next morning revealed over a hundred dead VC. The rounds not only killed troops, but destroyed an enemy 57mm recoilless rifle.[10]

On 20 March 1967, troops of the 3rd Squadron, 5th Cavalry near Ap Bau Bang used canister to kill enemy troops climbing on neighboring armored cavalry vehicles.[11]

On 10 March 1969, Troop A, 3rd Squadron, 4th Cavalry killed 40 North Vietnamese Army (NVA) soldiers and broke the attack. A historical study of the fight credits this incident with restoring some measure of soldier faith in the Sheridan after the vehicle had shown itself vulnerable to land mines.[12]

A tank from Bravo Company, 2-34 Armor, engaged a raft with 15 VC aboard. Employing 90mm canister, they destroyed the raft and killed all occupants.[13]

The effects of canister are devastating. NVA soldiers respected armor forces because of canister's deadly effect. The canister round's awesome reputation as a lethal killer contributed enormously to the shock effect created by U.S. armor in Vietnam. So devastating were its effects that other U.S. weapons like the 90mm/106mm recoilless rifles and 105mm howitzer, all adopted a canister munition during the Vietnam War.

APERS During the Cold War

In 1972, MG William R. Desobry, then CG of the Armor Center, was selected to head a task force to design a new main battle tank to replace the M60 series. Authors of the operational requirements were WWII veterans, and their wartime experiences heavily influenced the new tank's requirements, which ultimately lead to the development of the M1 Abrams tank.[14] Introduced first with a 105mm main gun, the M1 tank maintained a strong requirement for the long range APERS. The Army's APERS solution for 105mm-equipped tanks was the fuzed M494 Beehive round. Its effective range is 50-4400 meters. The 105mm Beehive, like the 152mm canister, also used flechettes. The 105mm Beehive, produced in the 1960s, satisfied the APERS requirement for the M60-series tanks, the M48A5 in Korea, and the defunct Armored Gun System (AGS).

When the M1A1 was fielded in 1986, no unique APERS round was required. The M1A1 was envisaged as a tank killer on the open, rolling terrain of Europe. For that reason, and because of the limited number of rounds the M1 would carry, the basic load of the M1A1 was exclusively made up of tank-killing ammunition. NATO allies did not invest the time or money on a special purpose APERS round for their 120mm fleet, nor did the U.S. Besides, the high explosive multi-purpose, M830 HEAT-MP and later the M830A1 MPAT rounds would satisfy the requirement to destroy secondary targets beyond machine gun range.

Today's Canister Requirement

USFK's APERS requirement calls for an Abrams force with the capability to destroy massed infantry quickly, effectively, and at short range. The Armor Center took USFK's requirement and expanded it to satisfy other user needs. In July 2000, the Armor Center forwarded for approval the official 120-mm canister operational requirements document, which outlines requirements for an anti-personnel capability enabling the Abrams tank to engage targets across the spectrum of conflict, from small-scale contingencies to major theaters of war.

The M1A1/M1A2 Abrams tank requires a simple, quick means of engaging massed infantry with an area weapon that provides a greater volume of fire than the tank's machine guns, or the organic weapons of friendly infantry operating in concert with tanks. The intent is to quickly suppress/neutralize threat infantry and to cause an adverse

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psychological impact on the threat force. The canister round will facilitate decisive, dominant maneuver and provide an offensive form of force protection. In the offense, canister will be employed to immediately clear enemy dismounts and to break up hasty ambush sites in urban areas. In close, compartmentalized terrain, its employment includes clearing defiles, and halting infantry attacks and counterattacks. Canister will also be used to support friendly infantry assaults by providing cover by fire. In the defense, the canister round will stop massed dismounted infantry assaults. Additionally, the canister will enhance lethality of combined arms teams operating in an economy of force role or Tactical Combat Forces (TCF) operating in Rear Area Combat Operations (RACO).

Canister Procurement Options

To procure the canister round, there are three main courses of action for the U.S. Army: procure an existing 120mm APERS cartridge from another army; partner with an ally to develop a canister round; or independently develop its own cartridge.

In 1999, the Armor Center, USFK, and the Tank-automotive and Armaments Command (TACOM) conducted a limited customer test of the existing Israeli APERS round. Tankers from 2ID evaluated the Israeli APERS round and determined it unsuitable for use. The tankers deemed the round too heavy, awkward to fuze, and difficult to quickly load during engagements. No other country has a 120mm APERS cartridge ready for purchase or test at this time, so procuring an existing 120mm APERS cartridge is not a viable consideration.

The German Army is working on a high explosive multi-purpose round with three modes (point, time and delay) for their Leopard II force. Unfortunately, the German cartridge will not be ready until 2005-06. Waiting that long is unacceptable, furthermore, the round would be expensive to acquire and require costly fire control modifications to the tank.

Developing our own canister round was the only viable option available. The Armament R&D Center (ARDEC) of TACOM, located at Picatinny Arsenal, N.J., has tested a low risk, inexpensive canister round that meets the Armor Force's requirement. ARDEC combined the lethal mechanisms of previously proven combat canister designs, and claims their solution can be developed quickly and inexpensively. Unfortunately, funds are not yet programmed for 120mm canister developmental work. The budget window of opportunity closed before the canister round had a chance to compete with other high priority Armor Center programs. However, should funds become available, ARDEC estimates a short two-year development and evaluation effort.

Summary

Our "legacy force" of Abrams and Bradleys will be part of the maneuver force for 20-plus years. Firepower upgrades like the canister and tank extended range munition (TERM) are required to sustain our dominant overmatch as we transform. The emerging canister capability will contribute to the Army's goal of developing a more lethal, agile, and versatile force capable of full spectrum combat.

Despite growing interest and priority, the 120mm canister round remains unfunded in the current defense budget, but the Armor Center is optimistic that the canister requirement will be validated and funded during the next budget cycle. With adequate funding, Army and Marine active and reserve component tank forces could enjoy the canister capability as early as 2003. Meanwhile, the Armor Center continues to lean forward in the saddle on this issue and others as we prepare our Armor Force for 21st century, full spectrum land combat.

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Notes

[1]The *Armor Magazine* article, "Sheridans in Panama," Mar-Apr 1990, pp. 8-15, by CPT Kevin J. Hammond and CPT Frank Sherman, never mentioned canister being fired during Operation Just Cause. They were, however, included in the basic load during that operation.

[2]An ORD is the definitive statement describing the operational capabilities needed to satisfy a mission need. It concisely states the User's minimum essential operational information needed for the acquisition of the materiel solution. Source: TRADOC Pamphlet 71-9, *Requirements Determination*, 1 Aug 98, p. 116.

[3]Constance Green, Harry C,. Thomson, and Peter C. Roots, *The United States Army In World War II: The Technical Services: The Ordnance Department: Planning Munitions for War*, Washington, D.C., Office of the Chief of Military History, 1955, pp. 370-371.

[4]Frank O. Hough, Verle E. Ludwig, and Henry Shaw Jr., *Pearl Harbor to Guadacanal: History of U.S. Marine Corps Operations in World War II*, Vol. I, HQMC, Washington D.C., 1957, p. 269.

[5]Perhaps Korean War veterans groups can shed light on this topic as we honor the 50th anniversary of the war and the men and women who served.

[6]TM 43-0001-28, *Army Ammunition Data Sheets for Artillery Ammunition: Guns, Howitzers, Mortars, Recoilless Rifles, Grenade Launchers and Artillery Fuzes*, 25 April 1977.

[7]Ibid., p. 2-48.

[8]Ibid., p. 2-54.

[9]*Canister versus Beehive Ammunition*, Committee Studies Report, Office of the Director of Instruction, U.S. Army Armor School, Fort Knox, Ky., 1968.

[10]GEN Donn A. Starry, *Mounted Combat in Vietnam*, Department of the Army, Washington D.C., 1978, p. 78.

[11]Ibid., p. 99.

[12]Ibid., p. 144.

[13]Lieutenant General Bernard William Rogers, *Vietnam Studies: Cedar Falls – Junction City: A Turning Point of the Army*, Washington D.C., 1989, p. 46.

[14]George F. Hofmann and Don A Starry, editors, *Camp Colt to Desert Storm*, University of Kentucky Press, Lexington, Ky., 1999, pp. 432-473.

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